

What is claimed is:

1        1. A digital hearing impairment simulation method comprising the steps

2 of:

3        (S1) inputting a hearing characteristic table of a hearing impaired person  
4 and storing the input table in a memory, in order to model the hearing  
5 characteristics of the hearing impaired person;

6        (S2) calculating a hearing loss table representing the difference between  
7 the hearing characteristic table of the hearing impaired person and a pre-stored  
8 hearing characteristic table of a normal person, and storing the calculated hearing  
9 loss table in said memory;

10       (S3) converting an audio signal input via an audio input portion to a digital  
11 signal and storing the converted digital signal in said memory;

12       (S4) converting said converted digital signal to the frequency domain signal  
13 using a fast Fourier transform algorithm;

14       (S5) calculating an average power for each of critical bands of said signal  
15 converted to the frequency domain;

16       (S6) calculating a hearing loss gain for each critical band, using said  
17 hearing loss table and said average powers of the critical bands;

18       (S7) calculating coefficients for a digital filter corresponding to said hearing  
19 loss gains of the critical bands;

20       (S8) digitally filtering the input signal converted to a digital signal and stored  
21 in said memory in said step (S3) using said digital filter coefficients; and

22       (S9) converting said digitally filtered signal to an analog signal and  
23 outputting the converted analog signal to an audio output portion.

1        2. The digital hearing impairment simulation method as claimed in claim

2 1, wherein said fast Fourier transform algorithm in said step (S4) is a 50%  
3 overlapped, 128 point fast Fourier transform algorithm having a sampling  
4 frequency of 12kHz.

1        3. The digital hearing impairment simulation method as claimed in claim

2 1, wherein said critical bands in said step (S5) are 20 bands increasing in size  
3 exponentially from a low frequency band to a high frequency band.

1           4. The digital hearing impairment simulation method as claimed in claim  
2, wherein said critical bands in said step (S5) are 20 bands increasing in size  
3 exponentially from a low frequency band to a high frequency band.

1           5. The digital hearing impairment simulation method as claimed in claim  
2, wherein said steps (S4) through (S9) are performed in units of a block  
3 consisting of 128 samples.

1           6. The digital hearing impairment simulation method as claimed in claim  
2, wherein said digital filter in said step (S8) is a frequency sampling filter.

1           7. A method for evaluating the performance of a hearing aid using a  
2 digital hearing impairment simulation method, said method comprising the steps  
3 of:

4           (S1) generating predetermined sound using an audiometer which is a sound  
5 source;

6           (S2) outputting the sound generated from said audiometer through said  
7 hearing aid;

8           (S3) converting the sound output from said hearing aid to sound reflecting  
9 the hearing characteristic of a hearing impaired person using a digital hearing  
10 impairment simulator which performs a digital hearing impairment simulation  
11 method, and outputting the converted sound; and

12           (S4) allowing a normal hearing person to listen to the sound output in step  
13 (S3) and checking the reaction of the listener to evaluate the performance of said  
14 hearing aid, wherein said step (S3) includes the sub-steps of:

15           (S3-1) inputting a hearing characteristic table of a hearing impaired person  
16 and storing the input table in a memory to model the hearing characteristic of the  
17 corresponding hearing impaired person;

18           (S3-2) calculating a hearing characteristic table using the difference value  
19 obtained by comparing the hearing characteristic table of the hearing impaired  
20 person with that of a normal person which is previously stored and stored in the  
21 memory;

22 (S3-3) inputting the audio signal output from the hearing aid to an audio  
23 input portion and converting the input signal to a digital signal and storing the  
24 same in the memory;

25 (S3-4) converting the digital signal in step (S3-3) to a frequency domain  
26 using fast Fourier transform algorithm;

27 (S3-5) calculating the average power by critical band of the signal which is  
28 converted to the frequency domain;

29 (S3-6) calculating hearing loss gain using the hearing loss table and the  
30 average power by critical band;

31 (S3-7) calculating a coefficient for a digital filer corresponding to the hearing  
32 loss gain by critical band;

33 (S3-8) digitally filtering the signal converted to a digital signal and stored in  
34 the memory in step (S3-3) using the coefficient for a digital filter; and

35 (S3-9) converting the digitally filtered signal to an analog signal and  
36 outputting the converted signal to an audio output portion.

8. The method for evaluating the performance of a hearing aid using a  
digital hearing impairment simulation method as claimed in claim 7, wherein, in  
said step (S4), the performance of said hearing aid is evaluated by measuring the  
sound output from said digital hearing impairment simulator using a measuring  
instrument.